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ABSTRACT

The paper reviews educational, medical, and psychopharmacological research concerning the academic, behavioral, and psychological responses of hyperactive children to stimulant medication. In Chapter 1 on the problem and plan of study, brief sections are included on the educational community's lack of knowledge regarding stimulant medication, the procedure used for collecting data, and research methodology in psychopharmacological studies (including guidelines for studies with groups of children and individuals). Covered in Chapter 2 are the academic, behavioral, and psychological responses to stimulant medication, and responses (such as unorthodox interpersonal relations) which need treatment other than drugs. Among conclusions presented in Chapter 3 are that many hyperactive youngsters show positive academic, behavioral, and psychological responses to stimulant medication; that if the child has experienced much school failure, he will need guidance in thinking of himself as a successful person; and that parents of hyperactive children find counseling helpful in relieving guilt and improving their relationship with their children. Appended are a list of seven distinct patterns of performance with their characteristic drug effects, a graph of the effects of stimulant drugs on psychological tests, Conners' Teacher Rating Scales, position papers from the American Academy of Pediatrics and the American School Health Association, and the Report of the Conference on the Use of Stimulant Drugs in the Treatment of Behaviorally Disturbed Young Children. (SB)

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ACADEMIC, BEHAVIORAL, AND PSYCHOLOGICAL RESPONSES OF HYPERACTIVE CHILDREN TO STIMULANT MEDICATION

A Master's Project Presented to
The Faculty of the Department of Special Education
Northeastern Illinois University

August 1975

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
In Special Education in Learning Disabilities

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BEHAVIOR AND LEARNING DISORDERS

HOURS BY APPOINTMENT

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June 18, 1975

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Department of Special Education

RE: Thesis, Mrs. Bradley

Gentlemen:

Eunice Bradley has asked that I respond to your request for a medical doctor's opinion of her paper concerning the use of stimulant medication with children with learning and behavior disorders.

I have read Mrs. Bradley's paper, and find it quite comprehensive. She has obviously done a thorough literature review, organized it nicely, and presented both the known facts as well as the divergent medical opinions currently prevalent. From reading her work, and from discussing it with her, I found that Mrs. Bradley has learned a great deal about the medications and their uses. She seems to have shown a remarkable ability to read frequently confusing, technical literature, has been able to critically appraise the various research designs and protocols, and has come out with a solid comprehensive understanding which probably surpasses that of many general pediatricians.

If you wish further information from me, please feel free to call me or to write.

Sincerely,

Keith R. McCloskey

Keith R. McCloskey, M.D.

KRM/eb

ACKNOWLEDGEMENT

The title page of this Master's Project only has one name listed. In reality, its creation was the result of many positive influences. These "special people" deserve recognition for their intangible, but very real part, in the authorship of this study.

How can I adequately express my appreciation

to Bill for his patience and encouragement?. . .

to Curtis and Guy for sharing me with other kids?. . .

to Mom and Dad for their continued support?. . .

to Keith for his high expectations?

The best way may be embodied in the objectives of this paper. Perhaps it is enough.

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CHAPTER I

THE PROBLEM AND THE PLAN OF STUDY

Central nervous system stimulant drugs have been used to treat hyperactive youngsters. Medications such as dextroamphetamine (Dexedrine), methylphenidate (Ritalin), and magnesium pemoline (Cylert) are most often used. These medications allow a hyperactive child to exhibit greater control over his activity. This ability to inhibit impulsivity and distractibility enables the child to attend with greater concentration.

Individual teachers have also noted the secondary effects which the use of stimulant medication seemed to have on the academic, behavioral, and psychological realms of a hyperactive youngster's life. However, many teachers could not adequately justify their endorsement of drug therapy for these children because of their limited knowledge in this field. The educational profession needs more of the empirical data from the controlled psychopharmacological studies in order to understand the appropriate role of drug therapy in the total education of hyperactive children.

Statement of the Problem

The educational community is largely unaware of, or has misconceptions about, the effect of stimulant medication

on the learning process, self-concept, emotional stability, and personality development of hyperactive children. The psychopharmacological research which empirically demonstrates these responses has been dispersed in the journals of many separate disciplines and has seldom reached the teachers who actually deal with these children.

In fact, there seems to be an attempt by some special educators to ignore the evidence. Myklebust's "all-encompassing book" entitled, Progress in Learning Disabilities, Volume II (1971), devotes one paragraph (p.85) to the use of CNS (central nervous system) medication.

In the recently published book, Learning Disabilities: Selected ACLD Papers, edited by Kirk and McCarthy (1975), there is an entire division concerning the medical aspects of learning disabilities. Within those twenty-eight pages, only two paragraphs (p.178, p.195) mention the use of stimulant medication with MBD (minimal brain dysfunction) children.

This study is intended to review and collate the educational, medical, and psychopharmacological research concerning the academic, behavioral, and psychological responses of hyperactive children to stimulant medication, so as to provide educators with a comprehensive documentation of these effects.

Procedure for Collecting Data

This research was conducted through a review of the educational, medical, and psychopharmacological literature. It was supplemented with personal interviews with members of the medical profession who are currently administering drug therapy.

It was highlighted by attending three conferences which featured professionals who are currently active in the research of the use of stimulant medication with hyperactive youngsters. These were the ACLD (International Association for Children with Learning Disabilities) Annual Conference, New York City, February 27 & 28, and March 1, 1975; the Medical Horizons Seminar,(Postgraduate education for physicians) in Chicago, April 10-11, 1975; and the ICCLD (Illinois Council for Children with Learning Disabilities) Annual Conference, Chicago, May 16-17, 1975.

Research Methodology in Psychopharmocological Studies

The credibility of any scientific research is based upon its degree of control and objectivity. The purpose of an objective, well-structured research model is to control all of the possible variables so that any response can be attributed directly to the stimulus, in this case, the stimulant drug. These factors are especially important when investigating something as subjective and emotionally-charged as

identifying behavioral changes in children who have been given stimulant drugs. Therefore, educators should know how to judge a good research model.

Guidelines for Psychopharmacological Studies with Groups of Children.

Conners (in Quay, 1972) has delineated the methodological considerations which should be incorporated in a good psychopharmacological research model:

Random assignments of drug and placebo. Good psychopharmacological research includes the use of a placebo. A placebo is "a 'dummy' pill or capsule made of an inert material, usually milk sugar, but fashioned to look like an active medication." (Gross & Wilson, 1974, p.162)

Since the active medication is readily identifiable by its appearance, some well-controlled studies insure anonymity by inserting the various medications in identically colored capsules. (Sprague, Christensen, & Werry, 1974) (Conners, 1972)

An individual is said to exhibit a "placebo effect" in a drug study when his behavior changes even though he is not receiving the active medication. This "placebo effect" is a control to show the amount of change which is stimulated by the extra attention a child is receiving, as well as the change due to an expectation of a drug effect.

However, some of this "placebo effect" would be lost if there were a known sequence for the administration of

the various medications in the study or if all of the subjects got the same type of medication at the same time.

Careful selection of homogeneous samples. Researchers in pharmacology prefer to associate one drug with one symptom which yields one clear-cut response. However, hyperactive children are not a homogeneous group who all show exactly the same symptoms.

A good research model should have a well-defined population whose basic identifiable disability is hyperactivity. Schain (1975) attributes the absence of a placebo effect in his study to the careful selection of a sample whose basic symptom was hyperactivity. He screened out the children who exhibited frank behavioral disturbances manifested by aggressive behavior, those from grossly disorganized homes, those with overt neurological syndromes, and those whose IQ was below 80.

It is often difficult to replicate the psychopharmacological research with MBD children and get similar results with a second group of youngsters because of their many individual responses to the medication. A single medication has yielded a variety of responses depending upon the deficits of each individual child.

Conners (1972 & in de la Cruz, 1973) has further subdivided this homogeneous category of MBD youngsters and has found characteristic responses in these groups. (Appendix A) This serves to emphasize the importance of sample selection.

Counterbalancing of treatment or test conditions. The research models, which have had a sample group large enough for statistical analysis with random assignment to the various treatments, have often been based on a heterogeneous group. Each child reacts to the medication in his own characteristic style. The research results which are published only show the mass changes. Therefore, some of the real drug effects are cancelled out by the non-reactors in the sample.

In the light of this, Conners (in Quay, 1972, p.318) feels that:

> a careful "clinical" trial which is "uncontrolled" may in fact be superior to an ostensibly tighter design. The clinician may be able to group patients in small but homogeneous groups and he may detect improvement or change in an area that would be insensitive to "objective measurement".

Objective, valid, and reliable measurements. Observations of behavioral changes are subjective in nature. One's emotions tend to color the observation.

Empirical data based upon objective, standardized measurements greatly enhances the credibility of research results. Good research models administer a reliable test instrument to the children before the drug trial and again after the drug has adequately taken effect. This facilitates an objective evaluation of drug effect.

Designing a good group research model is extremely complicated. These guidelines are often not followed because they are impractical in a particular situation or they are contradictory to one another.

However, in evaluating a study a teacher must analyze the design to see if it is adequate to support the conclusions which were drawn.

Guidelines for Psychopharmacological Studies with Individuals

Sleator and von Neumann (1974, p.20) point out that:

> "Within patient" design has important advantages over the "parallel" design, wherein two matched groups would be used, one receiving active medication only, the other only the placebo. With the "within patient" design, each child is given a trial of active medication and of placebo. Significant data can be obtained with fewer subjects, and it is easier to measure different effects of different mg/kg dosages, which is an important but neglected aspect of most research in this field. "Within patient" design lends itself particularly well to studying short acting drugs such as methylphenidate (Ritalin).

Dosage adjustment for optimum response. The response of a hyperactive child to stimulant medication is dose-related. There are different dose response curves for an individual child depending on which behavior is being

measured, according to Sprague (1975).

Weiss (1975) stated, that if stimulants are required, they should be administered in the lowest dosage possible to achieve the therapeutic results desired. Interestingly, this correlates with Sprague's findings (1975) that the optimum response to stimulant medication for enhanced learning performance and cognition is at a lower dosage than the optimum response for improved social behavior.

The appropriate dosage is highly individualized. Individuals differ in their rate of metabolism, the rate at which the drug is eliminated from the body, and the concentration of the drug which actually reaches the reticular system of the brain (Omenn, 1973). The conscientious physician will slowly titrate the dose upward until the optimum level is established.

The child's teacher and parents play an essential part in determining the optimum dosage. By reporting their observations to the physician, they enable him to evaluate the effectiveness of each titration level.

Child used as his own control. No research study can accurately predict the precise response of a child to stimulant drugs. The most accurate data concerning specific drug effects on a particular child can be gathered by using the child as his own control. The child is evaluated before medication in order to establish a baseline level on the measurements being employed. The drug effect is then noted.

CHAPTER II

REVIEW OF RELATED LITERATURE

The use of Central Nervous System (CNS) stimulants in the treatment of behaviorally disturbed youngsters is not a new idea. In the 1930's Charles Bradley, M.D., director of Bradley Hospital, a residential treatment center in East Providence, Rhode Island, used amphetamines with over-weight behaviorally disturbed youngsters. His original purpose was to use the drug as an appetite depressant.

He observed that Benzedrine produced "spectacular" effects on a number of children suffering from behavioral disorders. His original sample included thirty children with disorders ranging from specific learning disabilities, to aggressiveness associated with epilepsy, to withdrawn schizoid behavior. (Bradley, 1937)

They were in a controlled environment and were well known to their highly trained observers. Their increase in drive, interest, accuracy, and speed of comprehension was quickly noted. This resulted in a marked improvement in the school performance of fourteen of the boys.

This positive response incited further investigations in this area by Bradley. In 1950 he published the results of a decade of work involving behaviorally disturbed children.

He had treated 275 children with Benzedrine and 113 children with Dexedrine. Sixty to seventy-five percent of them showed improvement.

According to Conners (in Smith, 1970), most of the other studies involving amphetamines which were conducted previous to the 1960's lacked placebo controls, double-blind conditions, and appropriate statistical analyses.

There was a major revolution in psychiatry in the mid-1950's. Psychotic patients exhibited dramatic responses when tranquilizers were administered. Many patients who had been in mental hospitals for years were now able to be discharged and treated on an outpatient basis.

Attempts were made to gain similar dramatic results by administering these tranquilizers to hyperactive children. (Lipman, in Leeds, 1973) Equally dramatic negative results ensued.

Eisenberg and his colleagues turned their attention to stimulant drugs. The findings of Bradley were subjected to the sophisticated psychopharmacological methodology of the investigators, Eisenberg and Conners, at Johns Hopkins'.

In 1967, the federal grant for this research was transferred to Massachusetts General Hospital in connection with Harvard University. At that time, C. Keith Conners, Ph.D., became the principal investigator. He extended his research to include magnesium pemoline (Cylert), as well as the more thoroughly researched dextroamphetamine and methylphenidate.

Lipman (in Leeds, 1973, p.2) states that:

> The extensive publications of this group (Conners, Eisenberg, and their associates), spanning more than a decade of research experience, have firmly established the short-term efficacy of the stimulant medications in reducing hyperactivity, distractibility, and impulsiveness. . . .
>
> The stimulants were also effective in enhancing performance of a number of cognitive motor tasks including the Porteus maze, paired-associate learning, and various subtests of the Wechsler Intelligence Scale (WISC) and the Wide Range Achievement Test (WRAT).
>
> Furthermore, they have demonstrated effects on reaction time (RT), the orientating response, and various parameters of cortical evoked response.

The research findings which follow have been categorized according to types of drug effect: academic, behavioral, or psychological. This design was chosen in order to facilitate the comprehension of the many studies which have now been published.

Response of Hyperactive Children to Stimulant Medication

Academic response

The response of seventy-five children with minimal brain dysfunction who were administered stimulant medication in a controlled study was recorded by Conners (1972). The children were randomly assigned to treatment groups. Methylphenidate was given to twenty-nine subjects, dextroamphetamine was given to twenty-four subjects, and the remaining twenty-two subjects received a placebo.

All of the medication was administered in identically matched capsules. The dosage was increased weekly from 10mg to 30mg methylphenidate in divided doses given twenty minutes before breakfast and lunch, and from 5mg to 15mg dextroamphetamine given once a day.

Tests were administered before treatment and after they had been on treatment for six weeks. This was a double-blind study. Since the evaluators were not aware of the medication a particular child was receiving, the observations are even more credible.

Conners (1972, p.703) reported the effects of the active medication as compared to the placebo:

> The results showed the following significant ($p<.05$) treatment effects: WISC Full Scale IQ, WISC Verbal IQ, similarities, digit span, object assembly (subtests);

Frostig perceptual quotient (eye-motor coordination, figure-ground, form constancy), verbal fluency, teacher symptom ratings, Bender Gestalt, Draw-A-Man, Porteus Mazes, speech-noise test, continuous vigilance test (omissions and commissions). Rote learning and embedded figures showed effects significant at the 10% level. All differences were in favor of the drug treated Ss. Only two measures, WISC arithmetic and similarities, were significantly different between the two active drugs, both in favor of Ritalin. (Appendix B)

In a similar study Conners compared the relative drug effect of magnesium pemoline (Cylert), dextroamphetamine, and a placebo. Cylert was just released to the pharmacies in January 1975. It had gone through extensive testing, like this study, before physicians were allowed to prescribe it for their hyperactive patients.

Cylert is a weak central nervous system stimulant, comprised of pemoline and magnesium hydroxide, which had been reported to have significant anti-fatigue and performance enhancing properties. (Conners, 1971) T

The advantages are (1) it is taken once a day, (2) it has a prolonged duration, and (3) it has fewer reports of the side effects which are usually associated with stimulant drugs (insomnia and anorexia).

The main disadvantage of Cylert is that it normally takes at least three weeks of careful titration before any behavioral results are noticed. Large concentrations are usually needed in order to show a drug effect. On the other, hand, methylphenidate and dextroamphetamine often show an effect within thirty minutes.

In this eight week study, Conners (1971) recorded the following drug effects: both drugs (magnesium pemoline and dextroamphetamine) significantly reduced symptomatology over the placebo controls and showed significant treatment effect in the test scores for spelling, reading, Porteus maze IQ, Frostig perceptual quotient, eye movement, co-ordination, and figure-ground scores.

Various instruments have been employed to evaluate the effect of stimulant drugs on the academic realm of a MBD child's life. The results of some of the more popular ones are as follows:

Wechsler Intelligence Scale for Children (WISC). Knights and Hinton (1969) found a significant positive response on Performance IQ with methylphenidate. Most of the changes in this study, as well as in the first controlled study done by Molitch and Eccles (1937), appears to be in those tasks with a motor performance component. However, this differs from the above study by Conners (see p.12) where the improvement was noted in the Verbal IQ and the Full Scale IQ.

Conners (in Smith, 1970, p.91) explains this discrepancy by saying:

> Bradley had concluded that any improvement on intelligence tests were likely to be a function of the child's improved attitude towards the testing situation and his zest for achievement.
>
> Such a conclusion is supported by our findings that a large battery of personality tests shows a general achievement factor (need for achievement) improving with Dexedrine treatment, while intellectual measures when freed of this source of variance, do not show a drug effect.

Porteus Maze. "Perhaps the most interesting of our findings of stimulant effects with children is the consistent and rather dramatic effects of Ritalineand Dexedrine on Porteus Maze Performance." (Conners, in Smith, p.91)

The Porteus Maze is a paper and pencil test in which the child is asked to trace through a maze without lifting his pencil. It was devised as an intelligence test for aborigines. (Conners, 1975) "The test requires careful planning and forethought and places a premium on the executive, decision making function of intelligence." (Conners, in Smith, 1970, p.91)

The Porteus Maze is very sensitive to drug effect. In fact, the improvement was often as much as sixteen to twenty-

five IQ points (Conners, in Quay, 1972). The most dramatic effects were noted in the lower IQ ranges according to the research reviewed by Grinspoon and Singer (1973) and in the organically hyperactive youngsters rather than in the non-organic ones according to Epstein (1966).

Because of the dramatic changes exhibited in this test, Burleigh (1971) has proposed a new scoring method which physicians could use as an indicator of drug effect. Her hypothesis is that hyperactive children tend to perseverate by repeating an inappropriate behavior and not learning from their previous errors. When properly medicated these same youngsters are able to modify their behavior, or the route they are taking through the maze.

The drug effect which the Porteus Maze records has caused several investigators to hypothesize concerning a reason for this change. Sroufe (1973) suggests some of the characteristics which might be involved: planning, motor co-ordination, impulse control, sustained attention, continuous evaluation of performance, and persistence to completion of the task.

Learning disability tests. Since many hyperactive youngsters also exhibit learning disabilities, educators have inquired about the drug effect on the individual learning channels.

Parts of the Frostig Developmental Test of Visual Perception have shown drug effect. Conners (1972) noted a significant improvement in the eye-motor coordination, figure-ground, and form constancy subtests. Millichap (1975) also found that methylphenidate and dextroamphetamine caused a statistically significant improvement on the visual constancy subtest.

Both of these investigators also found a significant improvement in the Draw-A-Man score without the aid of educational therapy. Conners (1975) feels that the improvement in the Draw-A-Man test is caused by the child's increased ability to attend and to notice detail, not to a change in his grapho-motor skills.

Although the Koppitz scoring of the Bender-Gestalt (visual-motor) test did not show a significant change in Millichap's (1975) group, he did feel that the general appearance and organization was much better.

Conners feels that not all functions of visual perception are the same. Medication helps a child perceive visual differences and figure-ground differences, but it is not equally beneficial to all visual disabilities. (Conners, in Smith, 1970)

There have been fewer drug effect studies conducted on the auditory-verbal skills. Conners (in Smith, 1970) did find that auditory synthesis (sound blending) is statistically

sensitive (p .05) to drug effect, but auditory discrimination and auditory memory were not.

Creager and Van Riper (1967) documented a clinical response to stimulants which is often noticed: They found that the total number of words spoken and the number of verbal responses were significantly increased by methylphenidate. This was a measure of quantity not quality of verbal expression. If this verbosity could be tempered with the increased ability to make selective responses, a better quality of verbal expression might ensue.

Arithmetic. Bradley had found that arithmetic performance was the most reliably enhanced of the achievement scores. It is felt that amphetamines can improve performance on simple arithmetic, but it appears that more complex intellectual performance is not affected by these drugs. (Conners, in Quay, 1972) These observations seem to be in accordance with the following conclusions made by Werry about drug effect and task performance.

Task performance. Werry noted that various tasks were performed significantly better when hyperkinetic children were experiencing drug effect. He analyzed the tasks to detect the underlying conditions: (in Smith, 1970, p.140)

Task performance is improved:

(1) where the task is a simple repetitive motor one,

(2) where the level of the task is optimum, neither at the floor or ceiling of a child's ability and where the intervals of potential increment in performance are small and do not require a higher level of cognitive organization, nor are subject to some threshold effect, and

(3) where the task consists of a battery of standard psychological tests of intelligence and perceptuo-motor function. While few of the individual tests are significantly changed, the overall pattern across tests is significantly in the direction of improvement.

From these studies it is hypothesized that task performance would be most likely to improve when one or several of the following functions are involved: vigilance, speed of responding, short-term memory, resistance to fatigue or boredom, ability to ignore distracting stimuli, and simple motor skills.

Cognition. A number of studies have shown that stimulants have facilitatory effects on complex intellectual performances. It is difficult to interpret whether these are direct changes in higher cognitive functioning or limited changes in the information-processing skills.

The cognitive style and/or cognitive ability of hyperactive children is a direct reflection of their total behavior. According to Campbell, Douglas, and Morgenstern (1974, p.360), when not medicated:

> The hyperactive group was more impulsive, more field dependent, more constricted in ability to control attention, and slower on measures of automatization than the control group. The results clearly indicated that hyperactive children approach cognitive tasks differently than normal children. When required to select from several alternative responses, the hyperactive child is more likely to respond impulsively without evaluating the response possibilities. Moreover, when faced with alternative and contradictory cues, he is less apt to monitor his behavior and inhibit incorrect responses. On a task demanding the isolation of a relevant stimulus from a confusing background, he is more easily drawn by the most obvious and compelling aspects of the stimulus field. Finally, when the task requires rapid response rates, he is slower than the normal child, suggesting poor ability to concentrate. Taken together these data suggest that hyperactive children typically employ less efficient problem solving strategies than normal children.

Kagan and his colleagues (1966) have found impulsivity and reflectivity to be relatively stable across time and task. They referred to a cognitive style or conceptual tempo which characterizes a child. The impulsive child characteristically makes rapid decisions and many errors; the reflective child takes longer to make decisions and makes fewer errors. Reflectivity is clearly more compatible with school learning requirements than is the impulsivity which hyperactive children exhibit.

"This notion of reflectivity has great merit, for reflection implies proper focusing, sharpening, and memory scan before acting," according to Dykman, Ackerman, Clements, and Peters (1971, p.85).

Campbell, Douglas, and Morgenstern (1971) found that the cognitive styles, in the form of reflectivity, was indeed enhanced in hyperactive children by the administration of methylphenidate. The drug resulted in less impulsive responding and an improved ability to inhibit incorrect responses. The hyperactive children became significantly more reflective and made fewer errors of commission. They were able to delay responding sufficiently to consider all possible responses.

These researchers feel that these benefits may all result from a general increase in attention, response organization, and impulse control. Whatever the reason, these children were able to learn more efficiently.

Academic changes in non-hyperactive youngsters.

Academic improvement has also been found in some youngsters who were not hyperactive. Rachel Gittelman-Klein(1974) has studied the drug effect on children who were poor achievers. These children lagged behind in learning, but they were free of behavior disorders, conduct problems, and hyperactivity.

The drug treated group showed marked gains on the Porteus Maze and WRAT reading and arithmetic subtests after four weeks when compared to the minimal improvements of the placebo group.

This may indicate that stimulant drugs do have a positive effect on the cognitive function independent of their clinical action on behavior disorders.

The clinical research thoroughly substantiates the fact that academic abilities do indeed improve in most MBD children when they are under drug therapy utilizing central nervous system stimulant medication.

Behavioral response

The behavioral response of hyperactive children is the most noticeable and the most publicized effect. On January 11-12, 1971, the Office of Child Development and the Office of the Assistant Secretary for Health and Scientific Affairs, Department of Health, Education, and Welfare, called a conference to discuss the use of stimulant medications in the

treatment of youngsters with hyperkinetic behavior disorders. The panel reviewed the evidence and prepared an advisory report for professionals and the public. They summarized the behavioral effect in one concise paragraph:

> When the medication is effective, the child can modulate and organize his activities in the direction he wishes. The stimulant does not slow down or suppress the hyperkinetic child in the exercise of his initiative. Nor does it "pep him up," make him feel high, overstimulated, or out of touch with his environment. Much has been made of the "paradoxical sedative" effect of stimulants in such children. The term is inappropriate. Although their exact mechanism of action is not known, stimulants do not provide a chemical straitjacket. They do not act as a sedative. Rather, they appear to mobilize and to increase the child's abilities to focus on meaningful stimuli and to organize his bodily movements more purposefully. (U. S. Dept. of Health, Education, and Welfare, 1971, p.4)

Erenberg (1972, p.361) summarizes the behavioral effects of stimulant drugs in MBD youngsters in the Journal of Pediatrics:

> It is generally estimated that one-half to two-thirds of these children (MBD) will respond to the stimulant drugs with improved behavior. . . .

> The stimulant drugs tend to quiet and subdue behavior. Restlessness, overactivity, and distractibility are decreased; organization, goal-directed behavior, motivation, selectivity in response, attention span, and ability to concentrate are increased. . . . the favorable change noted by observational methods is most likely due to a shift toward situationally appropriate behavior.

Similar behavioral results are found throughout the research literature. (Millichap, 1968; Gross, 1970; and Weiss, 1975)

Evaluating behavioral changes. Observations of behavior tend to be subjective. In keeping with the guidelines which were set forth in Chapter I, the objective, valid, and reliable measures which have been used to measure the drug effect on behavior will be listed.

Conners' Teacher Rating Scale. In order to facilitate teacher observations of behavior, Conners developed a rating scale for teachers.(Appendix C). The scale asks the teacher to make qualitative judgments concerning thirty-nine behaviors which are listed. The three general categories are (a) classroom behavior, (b) group participation, and (c) attitude toward authority.

The Conners' Teacher Rating Scale proved quite useful in assessing and diagnosing hyperactive children in the classroom. He then developed the Conners' Abbreviated Teacher Rating Scale which consisted of the ten items from the longer scale which were most often checked and were most sensitive to drug change. These behaviors were:

(1) Restless or overactive
(2) Excitable, impulsive
(3) Disturbs other children
(4) Fails to finish things he starts, short attention span
(5) Constantly fidgeting
(6) Inattentive, easily distracted
(7) Demands must be met immediately-- easily frustrated
(8) Cries often and easily
(9) Mood changes quickly and drastically
(10) Temper outbursts, explosive and unpredictable behavior

(Sprague, Cohen, & Werry, 1974)

In collecting the normative data on these scales it became quite apparent that the hyperactive group is indeed very deviant from the normal group, and that these scales were valid measures of that deviation.

Aside from their use in psychopharmacological research, these scales are also utilized by physicians who are

administering drug therapy. The scales serve as a quick assessment of drug effect through which a teacher can meaningfully evaluate behavior. They also serve as a means for keeping communications open between the educational and medical realms.

Continuous Performance Test (CPT). The continuous performance test requires vigilance or continuous monitoring. The child is given a "target" stimulus for which he is to watch. At times more than one target stimulus is employed. The device presents a pattern of four stimuli every 1.6 seconds. When a target stimulus occurs, he is directed to respond by pressing a button. (Conners & Rothschild, 1968)

Distractible, hyperactive children soon tire of the task and make more errors than normal children. Conners and Rothschild found that CNS stimulant drugs reduced the hyperactive children's impulsivity in comparison with the placebo group. The placebo group became more impulsive as the test continued. The drug group also made fewer errors than the placebo group as the interval between presentation of stimuli lengthened.

The medication enhanced the hyperactive children's ability to stick to a monotonous, repetitious act. Although educators are the last to admit it, this ability is a real asset in learning and over-learning.

Reaction Time (RT). Researchers have seemed to disagree as to the effect of CNS stimulant medication on the reaction time of hyperactive children. The findings of the Continuous Performance Test were that the reaction time was less impulsive. However, some research indicates that the reaction time is speeded up. (Conners, in Quay, 1972)(Sprague, 1970)

The study of visual-perceptual speed by Spring (1972) indicated that the medication stabilizes the reaction time of hyperactive children making it similar to that of the normal children in the study.

Upon further analysis it is evident that the drug treated group in each case displayed behavior which was task appropriate and goal oriented. They were able to adapt their reaction time to the demands of the task.

Fine motor coordination and motor steadiness. Reitan (1966) spent years developing a series of tests which would detect behavioral impairments associated with brain damage. Parts of this series of tests have been extended downward in age for use with children. Of particular interest in drug studies is the Motor Steadiness Battery. (The normative data for the tests was provided by Knights and Moule, 1968.)

Knights and Hinton (1969) used the maze, graduated holes (holding a stylus in progressively smaller holes),

and pegboard tests from this battery. They found significant improvement in hyperactive children in the methylphenidate group when they performed the former two tests.

The drug effect on fine motor coordination and motor steadiness has also been noted by Epstein (1966) in both his organic and nonorganic groups.

According to Schain's recent study (1975) there were frequent reports of handwriting improving in clarity.

It seems logical that as a hyperactive child gained control over his actions, his fine motor skills would reflect this control.

Activity level. Devising an objective test to measure the activity level of children was a real challenge to the creativity of the research teams. Actometers (activity-watches worn on the wrist, which measure locomotion on a horizontal plane) were used in some studies according to Grinspoon and Singer (1973) with varying degrees of success.

The use of the stabilimetric seat, however, was indeed ingenious. This instrument can readily be attached to the bottom of a school seat. Wireless models are available; they are less noticeable to the child; therefore, they give a more accurate measurement. The stabilimetric seat indicates whenever a child sits down and how much he wiggles while he is seated.

Using this device, motor restlessness, in the form of "seat activity", was measurably reduced by methylphenidate. There was a concurrent increase in learning performance. (Sprague, Christensen, & Werry, 1974) (Sykes, 1971)

Interestingly, the "seat activity" of the placebo groups also decreased slightly when they were on-task. This suggests the involvement of the total body in the attending process.

Keogh reported the educational research which indicated that a successful problem solver regulates his movement during crucial points of learning. This ability to inhibit activity is essential for successful problem solving.

Learning disabled youngsters are characterized by Keogh (1971, p.105) as exhibiting:

> excessive, extraneous movements, especially of the head and eyes. . . .
> (This) heightened motor activity may disrupt learning by interfering with the accurate intake of information.

This could lead to the conclusion that CNS medications, which allow hyperactive children to control their movements, may also allow them to become better problem solvers.

Attention and Vigilance. Many research studies agree that the underlying characteristics which have been noted in all drug effects are the enhancement of the ability to attend and to maintain vigilance. (Conners, 1974) (Knights & Hinton, 1969) (Schain, 1975) (Sroufe, Sonies, West, & Wright, 1973)

Attending and vigilance abilities are attributed directly to the central nervous system's inhibitory power. Conners (in Smith, 1970, p.92) states that:

> (The) fact, of enhanced vigilance, together with various findings in children with hyperkinetic impulse disorders, in which enhanced selective attention and regulation of impulsivity occurs, suggests that the central arousal level may be involved in some important way in the action of the stimulants.

Satterfield (in Cantwell, 1975) explained his findings when he studied the physiological characteristics of hyperactive children who were good responders. Good responders are the individuals who show marked improvement with medication.

His research suggested that good responders have low central nervous system arousal before treatment. It was found that stimulant medication raised these low CNS arousal levels, as indicated by an increased skin conductance level.

Therefore, he feels that, the action of stimulant medication in these hyperactive children is to stimulate the CNS.

It is not the "paradoxical" calming that has been suggested for many years.

Fish (in Cantwell, 1975, p.114) states that "these are children whose central nervous systems are underaroused, and the drugs do exactly what they do in adults--stimulate and bring up the CNS activity to a normal level. Then the child can act calmer and less restless.

Satterfield (in Cantwell, 1975, p.75) explains this further by stating that the CNS arousal level and the ability to inhibit seem to vary directly with one another.

> Insufficient inhibitory control over motor functions could be expected to result in the commonly observed excessive and inappropriate motor activity exhibited in these children. . . .
>
> Lack of inhibitory control over sensory function could be expected to result in easy distractibility, with the low aroused child responding to irrelevant stimuli as readily as to relevant stimuli, Consistent with this theory is our finding that the lower the arousal level, the greater were the child's difficulties with distractibility and problems of attention in the classroom.

The stimulant medication adjusts the central nervous system to a more normal state in which a child can be in control of his sensory input and motor responses. He can begin to experience the world in a more normal manner.

Behavior in informal settings. Concern had been expressed about the effect of medication on a child when he was playing with his friends. Ellis, Witt, Reynolds, and Sprague (1974) found that methylphenidate does not influence the energy expenditure patterns but that its mode of action involves attentional mechanisms.

In fact, there were indications that it would improve his behavior when playing since the energy would be channeled into more organized, socially acceptable behaviors. (Grinspoon & Singer, 1973)

Behavioral responses to stimulant medication. In summary, the inner control which the hyperactive child has gained, when under drug therapy with stimulant medication, is most readily demonstrated in his behavior.

This control allows him to be selective in sensing and responding to his environment. Moreover, it makes him available to learning experiences--social, as well as academic.

Psychological response

In the studies reported by Bradley (1937), Benzedrine therapy not only resulted in a great increase in interest in school material and a "definite drive to accomplish as much as possible during the school period", but also an

interesting psychological response. The boys' personalities reflected an increased sense of well-being, a decrease of mood swings, mild euphoria, and less self-preoccupation.

Despite the limitations in the experimental research design in these early studies of Bradley, these clinical observations are quite credible. The boys were in a well controlled environment where they were under intensive observation of staff members who knew them well.

Clinical reports and controlled studies. The drug effect on the personality of a hyperactive child is highly individualized, and it would seem rather presumptuous to make a "blanket statement". However, certain behavior traits do seem to show a marked drug response.

In the following research, which was done through the use of rating scales or checklists of behavior, disruptive behavior seemed to be the behavior trait which was most noticeably affected by stimulants.

Knobel (1962) reported on 150 patients treated with Ritalin over a period of eight months. The symptoms most modified in this uncontrolled study were a decreased hyperactivity, increased frustration tolerance, less aggressiveness and destructiveness, diminished impulsivity, improved classroom performance, better peer relationships, and a marked decrease in hostility and resentment to authority figures.

Conners and Eisenberg (1963) found that in a group of severely disturbed and deprived children treated with methylphenidate, several psychological symptoms significantly improved. They were less demanding, less disobedient, and less quarrelsome. Their listlessness and apathy improved, and they were less childish or immature. They did less lying, and there was less of a tendency to lead others into trouble.

Parental evaluations of children in controlled drug studies has provided observations from the home environment. The parents of children, who Knights and Hinton (1968) treated with methylphenidate, reported these changes: reducation in symptoms of laziness, distractibility, restlessness while shopping, wiggling during homework and periods of quiet play.

In a study by Conners, Eisenberg, and Sharpe (1965), parents also rated the effect of Dexedrine on their children by the use of the Clyde Mood Scale. "Friendliness" and "Concentration" were the two factors which showed significant improvement over the placebo.

Sociometric ratings of peer perception of behavior were used to evaluate the effect of dextroamphetamine on twenty-one delinquent boys in a training school. The three worst behaved cottages where selected for the study. There were three treatment groups: control, placebo, and Dexedrine.

A fictitious class play was planned. It was found that the Dexedrine-treated subjects were assigned significantly more positive roles by their peers than before the drug, while the placebo and control groups showed no change in assignment. (Eisenberg, Lachman, Molling, Lockner, Mizelle, & Conners, 1963)

Observed effect in interpersonal relations. In general, the stimulant drugs seem to increase the positive interactions between the child and his family or peers and decrease the negative ones.

Rapaport (1974) analyzed the parent diaries for frequency of negative interactions. When given methylphenidate, the same youngsters showed a significant decrease.

This is also true of teacher-pupil interactions. Judith Rapaport, M.D. (1975) indicated that she really understood the frustration which hyperactive children can create in parents and teachers when she stated, "A hyperactive child induces negative behavior in adults."

It was her opinion that the quality of teaching improves when a child is under drug therapy. She did not explain this feeling. It might be interpreted in the light of her previous statement. When a child responds positively to a teacher, most teachers can find the enthusiasm and creativity to exert a renewed effort. The stimulant drugs allow the hyperactive child to exhibit these positive traits which parents and teachers appreciate.

The positive tone of their approach to new situations, when under drug therapy, was summarized by Barbara Fish, M.D. (in Cantwell, 1975, p.112), there is a "great increase in interest, particularly in school activities, and there is a drive to accomplish, and an increase of motivation for learning."

Barbara Keogh, Ph.D., an expert in the field of special education, who has gained the respect of her colleagues for her objective analyses, says, "Change in behavior in a more socially compatible direction, however, may be an extremely significant factor in learning success. In this sense, medication may indirectly facilitate improvement in learning." (1971, p.104)

Observed effects on personality. In 1971, Paul Wender, M.D., published a definitive work entitled, Minimal Brain Dysfunction in Children. No other book to date treats the subject with such depth of understanding or scope of possibilities for the future. His ideas, based on his observations, were truly ahead of their time. He stated that:

> In a moderate number of MBD children (perhaps one-fourth) amphetamines have a virtually specific therapeutic effect. . . . the drug appears to alter "basic" psychological functions in a most striking way, not simply reversing difficulties but promoting psychological growth. (p.89)

Wender (1971, p.163) also observes that:

> To the best of my knowledge one aspect of the drug action of certain stimulant drugs (amphetamine and methylphenidate) on MBD children is unique. They produce immediate psychological growth. While the drug is active, children may demonstrate age-appropriate psychological functioning which they have never attained previously.
>
> The unfortunate usage of the term "anti-regressive" to describe the action of the drug obscures the unusual effect. Such children are not regressed--they have never progressed as they should; these children are, so to speak, psychologically retarded and the unique effect of these stimulants is to produce temporary psychological maturation.

Wender notes that perhaps some children understand what is expected of them, but they are unable to comply. He has seen youngsters who have given a prompt response to stimulants by suddenly striving to behave in accordance with the rules they had heard but had never previously acted upon.

Apparently the child had already heard and learned the relationships between acts and consequences, but this awareness had not been evident in his behavior. "Under medication such awareness of these relationships does influence his behavior," according to Wender's observations. (1971, p.166)

He notes that another psychological change which sometimes occurs is the child's increased sensitivity to reward and punishment. Many youngsters will react by trying to avoid punishment and exhibiting an increased responsiveness to social controls which is accompanied by greater self-control.

Drug therapy and mental health. The life of a hyperactive child is filled with failures. He fails to meet his parents' expectations and causes frustrations. He irritates his siblings and is often the cause of disharmony in the family unit.

He fails in school because his behavior interferes with his ability to learn, and his constant activity interferes with his classmates' ability to learn.

He often fails with his peers socially, too. He isn't a very good listener. He is always jumping from one activity to another. He loses his temper easily and is unreasonable. The kids donnot want to be associated with someone who acts so "weird". Who wants a "retard" as a friend?

All of these failures can lead to a very low self-concept. This feeling of inadequacy and low self-worth can permeate his personality for the rest of his life.

This cycle does not have to occur. According to McBride (1973, p.313), "Drug therapy allows the child to learn normal responses and to make the proper adjustments

to daily stress. . . . The drugs, therefore, establish the opportunity for successful psychological development."

He feels that early drug therapy can have beneficial effects and can arrest serious ego damage to the child. A child who does not receive treatment could develop a depreciated self-concept and patterns of defeat and desperation. On the other hand, according to McBride (1973, p.309), "Adequate drug therapy is helpful in preventing children from developing a malicious cycle of antagonism and resistance to parents and school officials."

Response Which We Cannot Expect from Stimulant Medication Alone

As Keith R. McCloskey, M.D. (1975) pointed out, these children create excessive turmoil in the home. Their unorthodox interpersonal relations and the emotional hardship which they bring upon a family causes guilt, frustration, and anxiety. We can hardly eradicate all of those scars with a pill alone.

These families often need guidance and counselling in dealing with their feelings and interactions with their special child. The family can do much to enhance the effect of medication by structuring the child's environment and supporting him psychologically.

The hyperactive child who is under drug therapy is open to behavioral changes. However, this means changing

the patterns which he has practiced for several years. He often needs guidance in selecting new patterns. He also needs positive reinforcement when he does adopt these new behaviors as an indication that they are appropriate.

As Hollister, the father of psychopharmacology, once wrote, "There is no drug which can influence behavior as profoundly as a human relationship." (Weiss, 1975, p.8)

Barbara Fish, M.D., also feels that stimulant drugs do not change patterned activity of a child. The drug alone cannot ameliorate the learning disabilities which many of these hyperactive children exhibit. She states that,

> it is poor treatment if children are given medication without having had an adequate diagnostic evaluation for the educational problems--if they are given drugs as if that were going to do the whole job. (in Cantwell, 1975, p.115)

Stimulant medication makes learning disabled children "available to learning", but they still need the special help in developing learning patterns which their classmates learned years ago. They must be taught "how to learn".

CHAPTER III

SUMMARY AND CONCLUSIONS

Medical research indicates that many hyperactive youngsters have low centralnnervous system arousal levels. Their internal control systems are inadequate for the demands of today's society. They cannot inhibit their responses to external stimuli and are found to respond unselectively.

Stimulant medication normalizes their system. This, in turn, allows them to gain self-control. They can inhibit random responses and direct their attention selectively. They can enter our competitive school society on a more equal footing with their non-hyperactive peers.

Psychopharmacological research indicates that many hyperactive youngsters show positive academic, behavioral, and psychological responses to stimulant medication. The responses are very individual depending upon the basic deficit pattern of the child. However, the basic trend is in improved attention, vigilance, reflective thought, and a desire to succeed.

The medication does not eliminate the learning disabilities. It simply makes many hyperactive children "available" to education. They can concentrate on the task at hand and learn more efficiently. However, he still will need help

learning "how to learn". He probably will need special education techniques which are tailored to his learning patterns, and he may need tutoring or help from a learning disabilities teacher.

If he has experienced much failure in school, he will probably have a deflated self-image. He will need guidance in thinking of himself as a successful person. He will also need help learning acceptable behavior patterns. His parents can help by providing this guide.

Often families find that counselling by professionals, who understand the minimal brain dysfunction syndrome, is very helpful. It helps to relieve the unde guilt which burdens so many of these parents. It frees them to love and guide their child.

School failure, deflated self-images, and emotional difficulties can all result from hyperactivity. Many of these children could be helped. The devastating effects, which could impair one's mental health and self-concept for the rest of one's life, could be altered.

With this evidence before us, the education profession can no longer, with clear conscience, ignore the role which judicious drug therapy can play in the total education of hyperactive children.

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APPENDIX A

SEVEN SOMEWHAT DISTINCT PATTERNS OF PERFORMANCE WITH THEIR CHARACTERISTIC DRUG EFFECTS

(Conners, 1972, p.708)

SEVEN SOMEWHAT DISTINCT PATTERNS OF PERFORMANCE WITH THEIR CHARACTERISTIC DRUG EFFECTS

Conners found that within his selected population there were additional subgroups. These groups displayed individual patterns of drug effects. (1972)

Group		Drug Effect
I.	Very poor eye motor coordination and attention	Perceptual-motor factor showed significant drug effects
II.	Very poor on perceptual integration and spatial orientation	Improved in attention related tests and academic ratings
III.	Poor in spatial orientation, but good in eye motor coordination	Improved in attention related tests but academic ratings did not improve
IV.	Low in perceptual integration. Good in spatial orientation	Improved onlyoon tests like the Bender
V.	Baseline profile essentially flat, no test deficits. Some conduct problems reported by teachers or parents. (20% of total group)	No drug effect
VI.	Marked hemispheric asymmetry. Low in achievement. Poor classroom conduct.	Significant effect on academic performance, & spelling, & arithmetic.
VII.	Low in verbal IQ. Good in parent ratings	Changes seen in reading tasks

APPENDIX B

EFFECTS OF STIMULANT DRUGS ON

PSYCHOLOGICAL TESTS

(Conners, 1972, p.703)

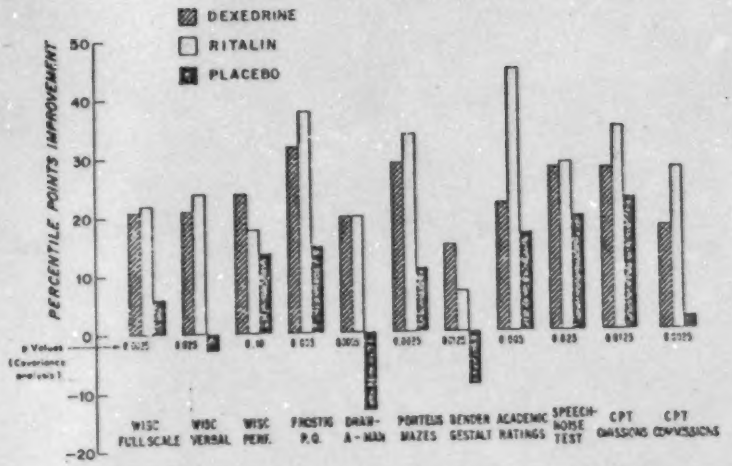

FIG. 1. Effects of stimulant drugs on psychological tests. ($N = 25$ per group.) Values shown are change scores from pre-treatment to post-treatment.

APPENDIX C

CONNERS' TEACHER RATING SCALES

(Conners, 1969)

Teacher Rating Scale

Observation

Degree of Activity

	Not at all	Just a little	Pretty much	Very much
CLASSROOM BEHAVIOR				
1. Constantly fidgeting				
2. Hums and makes other odd noises				
3. Demands must be met immediately - easily frustrated				
4. Coordination poor				
5. Restless or overactive				
6. Excitable, impulsive				
7. Inattentive, easily distracted				
8. Fails to finish things he starts - short attention span				
9. Overly sensitive				
10. Overly serious or sad				
11. Daydreams				
12. Sullen or sulky				
13. Cries often and easily				
14. Disturbs other children				
15. Quarrelsome				
16. Mood changes quickly and drastically				
17. Acts "smart"				
18. Destructive				
19. Steals				
20. Lies				
21. Temper outbursts, explosive and unpredictable behavior				
GROUP PARTICIPATION				
22. Isolates himself from other children				
23. Appears to be unaccepted by group				
24. Appears to be easily led				
25. No sense of fair play				
26. Appears to lack leadership				
27. Does not get along with opposite sex				
28. Does not get along with same sex				
29. Teases other children or interferes with their activities				
ATTITUDE TOWARD AUTHORITY				
30. Submissive				
31. Defiant				
32. Impudent				
33. Shy				
34. Fearful				
35. Excessive demands for teacher's attention				
36. Stubborn				
37. Overly anxious to please				
38. Uncooperative				
39. Attendance problem				

Conners' Abbreviated Teacher Rating Scale

Observation	Degree of Activity			
	Not at all	Just a little	Pretty much	Very much
1. Restless or overactive				
2. Excitable, impulsive				
3. Disturbs other children				
4. Fails to finish things he starts, short attention span				
5. Constantly fidgeting				
6. Inattentive, easily distracted				
7. Demands must be met immediately - easily frustrated				
8. Cries often and easily				
9. Mood changes quickly and drastically				
10. Temper outbursts, explosive and unpredictable behavior				

OTHER OBSERVATIONS OF TEACHER (Use reverse side if more space is required)

APPENDIX D

POSITION PAPERS:

AMERICAN ACADEMY OF PEDIATRICS

AND

AMERICAN SCHOOL HEALTH ASSOCIATION

POSITION PAPER

AMERICAN ACADEMY OF PEDIATRICS

On February 21, 1973, the American Academy of Pediatrics' Committee on Drugs issued a news release stating:

> At present there are only two valid indications for use of amphetamines in childhood.
>
> (1) the hyperkinetic syndrome. Such "overactive" children comprise about 3% of the grade school population, and usually suffer from short attention span, learning difficulties, and poor impulse.control. The condition apparently resolves itself spontaneously in most cases by puberty. No major problems with the use of amphetamines in such cases have been discovered.
>
> (2) Narcolepsy. This is a lifelong disorder characterized by excessive daytime sleep patterns. It is a relatively rare condition, and the dosage required for treatment is in the low range. (American Academy of Pediatrics, 1973, p.525)

POSITION PAPER ON MEDICATION AND THE HYPERKINETIC CHILD - AMERICAN SCHOOL HEALTH ASSOCIATION COMMITTEE ON DRUGS -- 1972

For selected children with hyperkinetic behavior disorders associated with minimal brain dysfunction, as diagnosed by their physician, and which disorders interfere with school adjustment and learning, appropriate medications and other supportive measures may be indicated. Medication and treatment must be prescribed by the child's physician and dosage of medication should be administered only in amounts prescribed. Continuous careful observation of the child by his physician, school personnel, and parents, and continuous exchange of information among these individuals is necessary to evaluate changes in behavior and learning; recognize signs and symptoms which may necessitate an alteration in the dosage schedule; and observe indications that may suggest medications should be terminated.

Appropriately prescribed medicines and other adjunctive procedures may assist many of these children to become better adjusted and better able to learn.

Spratto, G. R. Journal of School Health, November 1972, 42(9), p.525.

APPENDIX E

REPORT OF THE CONFERENCE ON THE USE OF STIMULANT DRUGS IN THE TREATMENT OF BEHAVIORALLY DISTURBED YOUNG SCHOOL CHILDREN

REPORT OF THE CONFERENCE ON THE USE OF STIMULANT DRUGS IN THE TREATMENT OF BEHAVIORALLY DISTURBED YOUNG SCHOOL CHILDREN

INTRODUCTION

On January 11-12, 1971, the Office of Child Development and the Office of the Assistant Secretary for Health and Scientific Affairs, Department of Health, Education, and Welfare, called a conference to discuss the use of stimulant medications in the treatment of elementary school-age children with certain behavioral disturbances. In convening the conference, the Office of Child Development was aware of public concern about the increasing use of stimulant medications (such as dextroamphetamine and methylphenidate) in treating so-called hyperkinetic behavior disorders. Were these drugs--so widely misused or abused by adolescents and adults--truly safe for children? Were they properly prescribed, or were they used for youngsters who, in fact, need other types of treatment? Is emphasis on medications for behavior disorders misleading? Might this approach tempt many to oversimplify a complex problem, leading to neglect of remedial social, educational or psychological efforts on the part of professionals, parents, schools and public agencies?

In order to clarify the conditions in which these medications are beneficial or harmful to children, to assess the status of current knowledge, and to determine the best auspices for administering these drugs to children, a panel of fifteen specialists was invited to meet in Washington. The panelists were from the fields of education, psychology, special education, pediatrics, adult and child psychiatry, psychoanalysis, basic and clinical pharmacology, internal medicine, drug abuse and social work. The panel's task was to review the evidence of research and experience and to prepare an advisory report for professionals and the public.

This report briefly outlines the general nature of behavioral disorders in children and then focuses on those disorders that are being treated with stimulant medications. It discusses appropriate treatment and the concerns voiced by the public and media. Finally, the report examines the role of the pharmaceutical industry, professionals, and the news media in publicizing stimulant drugs for children and outlines the glaring gaps in needed research, training and facilities.

BEHAVIOR DISORDERS OF CHILDHOOD

A wide range of conditions and disabilities can interfere with a child's learning at home and in school, his socialization with peers, and his capacity to reach his maximum development. Social deprivations and stress at home or school may retard optimal development. Mental retardation, the more rarely occurring childhood autism and psychosis, and other such disabilities may cause serious problems. Some difficulties arise because of clearly definable medical conditions such as blindness, deafness or obvious brain dysfunction. Some are associated with specific reading or perceptual defects, and others with severe personality or emotional disturbance.

Such dysfunctions are known to require careful evaluation, thoughtfully planned treatment employing a variety of methods on the child's behalf, and conscientious monitoring of remedial treatments. Individualized evaluation and treatment is important for any childhood behavior disorder. There are appropriate occasions for use of medications such as tranquilizers and anti-depressants in some children with these disorders. For over three decades, stimulant

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Sponsored by the Office of Child Development and the Office of the Assistant Secretary for Health and Scientific Affairs, Department of Health, Education, and Welfare, Washington, D.C., January 11-12, 1971.

medications have been selectively used for children under medical supervision. We now focus upon issues related to the current use of these drugs.

"HYPERKINETIC DISORDERS"

The type of disturbance which has evoked misunderstanding and concern has many names. The two most familiar--neither entirely satisfactory--are "minimal brain dysfunction" or, more commonly, "hyperkinetic behavioral disturbance." There is no known single cause or simple answer for such problems. The major symptoms are an increase of purposeless physical activity and a significantly impaired span of focused attention. The inability to control physical motion and attention may generate other consequences, such as disturbed mood and behavior within the home, at play with peers, and in the schoolroom.

In its clear-cut form, the overt hyperactivity is not simply a matter of degree but of quality. The physical activity appears driven--as if there were an "inner tornado"--so that the activity is beyond the child's control, as compared to other children. The child is distracted, racing from one idea and interest to another, but unable to focus attention.

INCIDENCE OF HYPERKINETIC DISORDERS

This syndrome is found in children of all socioeconomic groups and in countries throughout the world. A conservative estimate would be that moderate and severe disorders are found in about 3 out of 100 elementary school children--an estimate that would vary somewhat in different communities. More males than females are affected, as is true in a number of childhood ailments. Children so afflicted are generally of normal or superior intelligence. A significant number so diagnosed have special learning or reading disabilities, in addition to the major symptoms. A near majority are reported to have had behavioral problems since infancy. There is a smaller group of more severely afflicted children upon whom most studies have focused they may show increased clumsiness and a variety of physical symptoms. Thus, some of the children show hyperactivity and reduced attention which ranges in degree from mild to severe, with or without associated physical signs or special learning impairments; some have complex behavioral and personality problems, as well as special learning and reading difficulties, along with the major hyperkinetic symptoms.

CAUSES OF HYPERKINETIC DISORDERS

We know little about definitive causes. The disorder has been ascribed to biological, psychological, social or environmental factors, or a combination of these. There is speculation that the core set of symptoms--those affecting control of attention and motor activity--may have their origin in events taking place before the child is born, or during the birth process, or they may be related to some infection or injury in early life. The neurological and psychological control of attention is an important but incompletely researched topic, as are the nutritional, perinatal and developmental factors. Thus, in many instances, it is not yet possible even to speculate as to original causes.

THE COURSE OF HYPERKINETIC DISORDERS

Usually, the excessive activity and attentional disturbances are less apparent after puberty. Specialists citing experience and some fragmentary research data believe that treatment enables many to lead productive lives as adults, while severely afflicted children who remain untreated may be significantly at risk for adult disorders. Extensive research is still required on these points. Because the ages of 5 to 12 are crucial to the child's development and self-image, treatments which permit the child to be more accessible to environmental resources are warranted and useful.

DIAGNOSIS OF HYPERKINETIC DISORDERS

In diagnosing hyperkinetic behavioral disturbance, it is important to note that similar behavioral symptoms may be due to other illnesses or to relatively simple causes. Essentially healthy children may have difficulty maintaining attention and motor control because of a period of stress in school or at home. It is important to recognize the child whose inattention and restlessness may be caused by hunger, poor teaching, overcrowded classrooms, or lack of understanding by teachers or parents. Frustrated adults reacting to a child who does not meet their standards can exaggerate the significance of occasional inattention or restlessness. Above all, the normal ebullience of childhood should not be confused with the very special problems of the child with hyperkinetic behavioral disorders.

The diagnosis is clearly best made by a skilled observer. There unfortunately is no single diagnostic test. Accordingly, the specialist must comprehensively evaluate the child and assess the significance of a variety of symptoms. He considers causal and contributory factors--both permanent and temporary--such as environmental stress. He distinguishes special dysfunctions such as certain epilepsies, schizophrenia, depression or anxiety, mental retardation or perceptual deficiencies. The less severe and dramatic forms of hyperkinetic disorders also require careful evaluation. Adequate diagnosis may require the use not only of medical, but of special psychological, educational and social resources.

TREATMENT PROGRAMS

The fact that these dysfunctions range from mild to severe and have ill-understood causes and outcomes should not obscure the necessity for skilled and special interventions. The majority of the better known diseases--from cancer and diabetes to hypertension--similarly have unknown or multiple causes and consequences. Their early manifestations are often not readily recognizable. Yet useful treatment programs have been developed to alleviate these conditions. Uncertainty as to cause has not prevented tests of the effectiveness of available treatments, while the search for clearer definitions and more effective kinds of therapy continues. The same principles should clearly apply to the hyperkinetic behavior disorders.

Several approaches now appear to be helpful. Special classes and teachers can be directed to specific learning disabilities and thus restore the confidence of the child who experiences chronic failure. Modification of behavior by systematic rewarding of desired actions has been reported to be useful in some children. Elimination of disturbing influences in the family or classroom through counseling may often tip the balance, and a happier child may show improved control and function.

There will be children for whom such efforts are not sufficient. Their history and their examination reveal symptoms of such a driven nature that skilled clinicians undertake a trial of medical treatment. Medicine does not "cure" the condition, but the child may become more accessible to educational and counseling efforts. Over the short term and at a critical age, this can provide the help needed for the child's development.

Stimulant medications are beneficial in only about one-half to two-thirds of the cases in which trials of the drugs are warranted. The stimulant drugs are considered to be the first and least complicated of the medicines to be tried. Other medications--the so-called tranquilizers and anti-depressants--are generally reserved for a smaller group of patients. Without specialized medical therapy, the consequences for these children of their failure to manage--even in an optimal environment--are clearly very severe. In such cases, the aim is not to "solve problems with drugs," but to put the severely handicapped child in a position to interact with his environment to the extent that his condition permits.

Response to stimulant medication cannot be predicted in advance. Fortunately, the issue can be resolved quickly. When stimulants are given in adequate doses, a favorable response--when it occurs--is fairly rapidly obtained and is unmistakably the consequence of the drug. Thus, if an adequate test of pharmacotherapy (a few days or weeks) produces only doubtful benefits or none at all, treatment can be promptly terminated. The physician will,

of course, adjust dosage carefully to assure an adequate therapeutic trial. It would be tragic to deprive a child of a potentially beneficial treatment by inattention to dose. Thus, it is clear that not all affected children require medication and that of those who do, not all respond.

When the medication is effective, the child can modulate and organize his activities in the direction he wishes. The stimulant does not slow down or suppress the hyperkinetic child in the exercise of his initiative. Nor does it "pep him up," make him feel high, overstimulated, or out of touch with his environment. Much has been made of the "paradoxical sedative" effect of stimulants in such children. The term is inappropriate. Although their exact mechanism of action is not known, stimulants do not provide a chemical straitjacket. They do not act as a sedative. Rather, they appear to mobilize and to increase the child's abilities to focus on meaningful stimuli and to organize his bodily movements more purposefully.

The hoped-for secondary consequences are better peer relationships, improved self-image, and pleasure in acquiring competencies. Any coexisting dysfunctions--such as special perceptual and learning handicaps--must not be left unattended, simply because pharmacotherapy is available and sometimes helpful. Similarly, personality and psychological problems, social and family problems, may require continued attention.

During drug treatment, the dosage may require shifting to minimize unwanted effects, of which the major ones are loss of appetite and insomnia. Drug treatment should not and need not be indefinite, and usually is stopped after the age of 11 or 12. Frequently, following a sustained improvement over several months or a year or so, drugs may be discontinued, as during a vacation period. Drug-free intervals can be prolonged as observers assess the child's condition.

The decision to use drug treatment thus depends on the commitment to diagnose and to monitor the response to treatment in the best traditions of medical practice. When there is informed parental consent, parents, teachers and professionals can collaborate in organizing and monitoring treatment programs.

CONCERNS RAISED BY THE PUBLIC AND THE NEWS MEDIA

We will now turn to various concerns about hazards and abuses when stimulant medications are used for children. For example, concern has been expressed that the medical use of stimulants could create drug dependence in later years or induce toxicity. This subject touches on the rights of the child to needed treatment, as well as risks to both the child and the public, and requires continued intensive scrutiny.

1. Does the medication produce toxicity?

One should not confuse the effects of intravenous stimulants and the high dosages used by drug abusers with the effects or the risks of the low dosages used in medical therapy. In the dosage used for children, the questions of acute or chronic toxicity noted in the stimulant abuser are simply not a critical issue. Unwanted mental or physical effects do rarely appear in children; cessation of therapy or adjustment of dosage quite readily solves the problem.

2. Is there a risk of drug dependency in later years?

Thirty years of clinical experience and several scientific studies have failed to reveal an association between the medical use of stimulants in the pre-adolescent child and later drug abuse. Physicians who care for children treated with stimulants have noted that the children do not experience the pleasurable, subjective effects that would encourage misuse. They observe that most often the child is willing to stop the therapy, which he views as "medicine." Thus, the young child's experience of drug effects under medical management does not seem to induce misuse. The medical supervision may "train" him in the appropriate use of medicines.

When adults are given stimulants--or even opiates--for time-limited periods under appropriate supervision and for justifiable reasons, there is relatively little misuse. Similarly, in treating epilepsy, barbiturates have been given from infancy to adulthood without creating problems of dependency or abuse.

It is not ordinarily the drug which constitutes abuse but the way in which a drug and its effects are used and exploited by an individual. There are indeed adolescents who, in varying degrees and for varying periods of time, either misuse or dangerously abuse stimulants. They experiment with the effects of excessive dosages to create excitement, to avoid sleep, to defy constraints, and to combat fatigue and gloom. It should be noted that these drugs are not commonly prescribed to children after the age of 11 or 12, when the actual risks of such experimentation or misuse might possibly become more significant.

Alter monitoring of drug use at any age is a part of sensible medical practice. With such precaution and with the available evidence, we find minimal cause for concern that treatment will induce dangerous drug misuse. To the contrary, there are very good reasons to expect that help, rather than harm, will be the result of appropriate treatment.

3. Are there safeguards against misuse?

There are some sensible steps, in addition to medical control, that guard against possible misuse. The child should not be given sole responsibility for taking the medication. He usually need not bring the drug to school. The precautions that surround the medicine cabinet--whether antibiotics, aspirins, sedatives or other medications are present--should be applied. Many such medicines, when misused, can be more dangerous to health and life than even the stimulant drugs. No child in the family should have access to medications not prescribed for him. These are general precautions comprising a part of the child's education in the "etiquette of the medicine cabinet."

4. Do stimulants for children create a risk for others?

The panel agrees that stimulant drug abuse is seriously undesirable and not infrequently dangerous, although views vary on the scope of the problem and the number of actual casualties. Experts also agree that far more stimulants are prescribed for adults than are medically needed and far more are manufactured than prescribed. Overprescription of any medication is deplored, whether or not it is liable to abuse. The question is whether the availability of stimulants for a very few of the childhood behavior disorders threatens the public health.

The prescribed dosage for an individual child constitutes an insufficient quantity to supply the confirmed abuser of stimulants with the amounts he requires. It is also true that illicitly manufactured stimulants are quite readily available and abused in this country. We must weigh the advantages of having appropriate medication available against the dangers of withholding treatment from a child who can clearly benefit from it. We doubt that prescriptions for the children who benefit from stimulants will require the manufacture of excessive and dangerously divertible supplies. With sensible precautions, there is at present no evidence justifying sensational alarm, either about the safety of the individual child who can benefit from therapy or about the safety of the general public.

5. Does medication handicap the child emotionally?

It is sometimes suggested that treated children may not be able to learn normal responses and master adjustments to the stresses of everyday life. These fears are understandable but are not confirmed by specialists who have experience with the conditions and the situations in which medications are properly used. For the correctly diagnosed child, these medications--if they work at all--facilitate the development of the ability to focus attention and to make judgments in directing behavior. Such children can acquire the capacity to tolerate and master stress. The medications, in these circumstances, help "set the stage" for satisfactory psychological development.

The hyperkinetic behavioral disturbance is a form of disorganization that creates great

stress in the afflicted child. The use of therapeutic stimulants for this disturbance should not be equated with the misuse of medication aimed at allowing a normal child or adult to avoid or escape the ordinary stresses of life.

6. What are the rights of the parents?

Under no circumstances should any attempt be made to coerce parents to accept any particular treatment. As with any illness, the child's confidence must be respected. The consent of the patient and his parents or guardian must be obtained for treatment. It is proper for school personnel to inform parents of a child's behavior problems, but members of the school staff should not directly diagnose the hyperkinetic disturbance or prescribe treatment. The school should initiate contact with a physician only with the parents' consent. When the parents do give their approval, cooperation by teachers, social workers, special education and medical personnel can provide valuable help in treating the child's problem.

STIGMATIZING THE MEDICINES AND CHILDREN, AND THE ROLE OF PUBLIC EDUCATION

A child who benefits from stimulants or other psychotropic medications should not be stigmatized; his situation is no different from that of the child who benefits from eyeglasses. It is unjust to stigmatize a child in later life, when competing in various situations (applying for college, employment or organization memberships), by labeling him early in life as "stupid," an "emotional cripple," a "drug-taker," or by any other kind of unjustified and unfortunate stereotype.

Nor should the medicine be stigmatized. Where bad practices prevail--and a number of complaints have been called to our attention--these practices should be squarely dealt with. This is not only a responsibility of physicians and educators, but also of the news media. Yet indignation must be tempered with perspective and scrupulous respect for the facts. An informed and understanding public can foster the growth and development of children, and these public attitudes may lead to the development of more refined and better-delivered health services. Either bad practices or exaggerated alarm can threaten the availability of medical resources for those who critically need it. This has happened before in the history of valuable medicines, and it can take years to repair the damage.

THE PROMOTION OF DRUGS BY INDUSTRY AND THE MEDIA

Pharmaceutical companies producing stimulants or new medications which may becom useful for hyperkinetic disorders have a serious obligation to the public. These medicines should be promoted ethically and only through medical channels. Manufacturers should not seek endorsement of their products by school personnel. In the current climate, society can best be served if industry refrains from any implicit urging that nonspecialists deal with disorders and medications with which they are unfamiliar. Professionals and the news media c play useful roles by not pressing for treatments in advance of their practical availability.

THE DELIVERY OF SPECIAL HEALTH CARE: A DILEMMA

Our society has not as yet found complete solutions to the problem of the delivery o special health care. When available treatments cannot be confidently and appropriately delivered by physicians, they are perhaps best withheld until such treatments can be provided--especially with milder dysfunctions. This is not to say that severely afflicted hyperkinetic children should not or cannot receive available medical treatment. But until sy tems of continuing professional education and ready access to consultants are financed and perfected, some judgment about the pace at which unfamiliar treatments can be widely foste is required. Finally, we must recognize that it is not only the scarcity of trained personne but factors such as poverty and inadequate educational facilities which prevent accessibility t individualized treatment.

THE NEED FOR SKILLS AND KNOWLEDGE

In preparing this report, the Committee was repeatedly struck by our lack of information in many crucial areas. The facts are that children constitute well over half our population, but receive a disproportionately low share of skilled research attention. We have noted the difficulties in arriving at accurate methods of diagnosis and the importance of launching careful longitudinal and follow-up studies. The investigation of causal factors lags. Such factors as perinatal injury, environmental stress or the development of the neurological and psychological controls of attention require study. Variations in different socioeconomic and ethnic groups must be considered in order to arrive at better definitions of behavior properly regarded as pathological. All such research efforts would have aided us in assessing the numbers of affected children and in recommending designs for more effective treatment programs.

Clinical pharmacologists have repeatedly found that drugs may act differently in children than in adults. To use medicines of all kinds effectively in children, more specialists must be trained in drug investigation--pharmacologists who can develop basic knowledge about the action of drugs in the developing organism. There is the obvious need for better and more precisely targeted drugs for the whole range of severe childhood behavior disorders. This requires intense research and training efforts. Such efforts provide the means for developing, testing and delivering better treatment programs. There is a similar need for research in the techniques of special education and also a need to make these techniques available to children who can benefit. It would appear to be a sound Federal investment to conduct such research and training.

In summary, there is a place for stimulant medications in the treatment of the hyperkinetic behavioral disturbance, but these medications are not the only form of effective treatment. We recommend a code of ethical practices in the promotion of medicines, and candor, meticulous care and restraint on the part of the media, professionals and the public. Expanded programs of continuing education for those concerned with the health care of the young, and also sustained research into their problems, are urgently needed.

Our society is facing a crisis in its competence and willingness to develop and deliver authentic knowledge about complex problems. Without such knowledge, the public cannot be protected against half-truths and sensationalism, nor can the public advance its concern for the health of children.

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GLOSSARY

Anorexia: Loss of appetite.

Benzedrine: trade name for amphetamine sulfate. A mixture of the dextro- and the levo- isomers of amphetamine.

d-amphetamine: dextroamphetamine.

Dexedrine: trade name for dextroamphetamine sulfate.

Double blind: "A pattern for a research study to test the effectiveness of a medication. The patient is given either an active medication or an identical looking sugar pill, coded so that neither the patient nor the doctor know which is which. Thus pre-judgment or suggestion cannot enter into the evaluation. Only the head of the research project has the key to the code, and he does not break the code until the data are complete." (Gross & Wilson, p.157)

Hyperkinesis, hyperkinetic: excessive activity; hyperactivity

Insomnia: difficulty falling asleep and/or staying asleep.

Minimal brain dysfunction (MBD): the compromise term decided upon by the Easter Seal Research Foundation and the National Institutes of Health. They needed a universal label instead of the numerous ones which were only confusing the public (such as, brain-injured, perceptually handicapped, neurologically handicapped). The word minimal rules out the more serious forms of chronic brain dysfunction, such as cerebral palsy and epilepsy.

Neurologic signs: "Changes in sensation, muscular strength, muscular coordination, and reflexes, indicating some gross malfunction of the brain and/or the rest of the nervous system. Also called 'hard' neurologic signs, to distinguish from 'soft' signs, which are more equivocal." (Gross & Wilson, 1974, p.161)

"p": "This refers to 'probability' in statistics. If p is less than (<)0.05, it means that there is less than 5 chances in 100 that the results obtained could have come from random variation alone.. . . If p is less than 0.05, scientists give good credence to the validity of the results, which are said to be 'statistically significant." (Gross & Wilson, 1974, p.162)

Perseveration: repetition of an activity long after its usefulness has been served.

Pharmacotherapy: treatment with medicines.